

What is Claimed:

1. A method for identifying an miRNA and its target RNA, the method comprising
  - (a) obtaining an miRNA/target RNA complex;
  - 5 (b) optionally crosslinking the complex;
  - (c) transcribing target complementary RNA (tcRNA) from the target RNA;
  - (d) synthesizing cDNA complementary to the tcRNA; and
  - (e) sequencing the cDNA,thereby identifying the miRNA and its target.
- 10 2. The method of claim 1, wherein obtaining the miRNA/target RNA complex comprises
  - (a) obtaining miRNA;
  - (b) administering miRNA to a cell or cell extract; and
  - 15 (c) allowing miRNA/target RNA complexes to form;thereby obtaining an miRNA/target RNA complex.
3. The method of claim 1, further comprising:
  - (a) contacting the miRNA/target RNA complex with a bifunctional biotin-aminopentyl 8-hydroxypsoralen (Compound 1); and
  - 20 (b) photocrosslinking the complex.
4. The method of claim 3, further comprising immobilizing the miRNA/target RNA complex using avidin-coated magnetic beads.
- 25 5. A method for identifying a target RNA of an miRNA, the method comprising
  - (a) obtaining a modified miRNA comprising an amino-modified cytosine or amino-modified uracil;
  - 30 (b) contacting the miRNA with a target RNA;
  - (c) allowing an miRNA/target RNA complex to form;

- (d) labeling the complex with a biotin compound selected from an NHS activated ester of biotin butanoic acid (Compound 2) or photocleavable biotin (Compound 3);
- (e) transcribing target complementary RNA (tcRNA) from the target RNA;
- 5 (f) synthesizing cDNA complementary to the tcRNA; and
- (g) sequencing the cDNA,
- thereby identifying the target RNA.

6. The method of claim 5, further comprising immobilizing the

10 miRNA/target RNA complex using avidin-coated magnetic beads.

7. A method for identifying the target RNA of an miRNA, the method comprising
- (a) obtaining an miRNA having a known sequence;
- 15 (b) contacting the miRNA with a target RNA;
- (c) allowing an miRNA/target RNA complex to form;
- (d) labeling the miRNA/target RNA complex with a compound selected from an activated ester of hexanoic acid linked with a biotin and a 4-thio-uracil (Compound 4) or an activated ester of hexanoic acid linked with a biotin
- 20 and 8-hydroxy-psoralen (Compound 5);
- (e) optionally crosslinking the miRNA/target RNA complex;
- (f) transcribing target complementary RNA (tcRNA) from the target RNA;
- (g) synthesizing cDNA complementary to the tcRNA; and
- (h) sequencing the cDNA,
- 25 thereby identifying the target RNA.

8. The method of claim 7, further comprising the step of immobilizing the complex on avidin-coated magnetic beads.

30 9. The method of any one of claims 1-8 wherein the miRNA/target RNA complex forms in a cell-free solution.

10. The method of any one of claims 1-8 wherein the miRNA/target RNA complex forms in a cell.

11. A method for identifying the target RNA of an miRNA, the method  
5 comprising  
(a) contacting a biotin-labeled miRNA having a known sequence with a target RNA;  
(b) allowing an miRNA/target RNA complex to form;  
(c) crosslinking the miRNA/target RNA complex, *e.g.* with a psoralen  
10 compound or other crosslinking agent;  
(d) immobilizing the complex on avidin-coated beads;  
(e) reversing the crosslink;  
(f) transcribing a complementary strand from the target RNA using reverse transcriptase and a cDNA primer, *e.g.*, a primer having a sequence  
15 corresponding to the miRNA;  
(g) synthesizing cDNA complementary to the transcribed strand of (f); and  
(h) sequencing the cDNA,  
thereby identifying the target RNA.

20 12. The method of claim 11, wherein step (c) comprises crosslinking the miRNA/target RNA complex via a modified nucleotide in the miRNA.

13. The method of claim 12, wherein the nucleotide is a uridine or cytidine within the miRNA.

25 14. The method of claim 13, wherein the modified nucleotide is an amino-modified uridine or amino-modified cytidine within the miRNA.

15. The method of claim 12, wherein the nucleotide is a uridine, thymidine or  
30 guanosine within the miRNA.

16. The method of claim 15, wherein the modified nucleotide is a 4-thio uridine, 4-thio thymidine or 6-thio guanosine within the miRNA.

17. The method of claim 12, wherein the crosslink is targeted to the 5' end of  
5 the miRNA

18. The method of claim 17, wherein the crosslink comprises an amino-modified 5' nucleotide.

19. The method of claim 18, wherein the crosslink comprises an amino-modified 5' uridine or cytidine.  
10

20. The method of claim 12, wherein the crosslink is targeted to the 3' end of the miRNA.  
15

21. The method of claim 20, wherein the crosslink comprises an amino-modified 3' nucleotide.

22. The method of claim 21, wherein the crosslink comprises an amino-modified 3' uridine or cytidine.  
20

23. The method of claim 11 wherein the miRNA/target RNA complex forms in a cell.

24. The method of claim 11 wherein the miRNA/target RNA complex forms in a cell-free solution.  
25

25. A method for identifying a target RNA of an miRNA, the method comprising  
30

- (a) contacting a cell with a psoralen-biotin conjugate such that the conjugate binds to target RNA within the cell;
- (b) allowing the target RNA to form a complex with miRNA within the cell;

- (c) immobilizing the miRNA:target RNA complex on avidin-coated beads;
  - (d) reversing the crosslink;
  - (e) transcribing a complementary strand from the target RNA using reverse transcriptase and a poly A primer;
  - 5 (f) synthesizing cDNA complementary to the transcribed strand of (f); and
  - (g) sequencing the cDNA,
- thereby identifying the target RNA.

26. A method for modulating the expression of a target RNA in a cell, the
- 10 method comprising
- (a) identifying an miRNA that affects the expression of the target RNA using the method of any one of claims 1, 5, 7, 11 or 25; and
  - (b) modulating the activity of the miRNA in the cell
- thereby modulating the expression of the target.

15

27. The method of claim 26 wherein the expression of the target RNA is increased or decreased.

28. The method of claim 26 wherein the target RNA encodes a gene involved
- 20 in a proliferative or differentiative disease.